Metabolomics Foundations & Experimental Design — Hands-on

Learn how to go from a biological question to a statistically-sound metabolomics study plan. This module builds strong foundations in metabolomics concepts, readouts, and experimental design — including platform choice, cohort definition, confounder control, QC strategy, and power/sample-size thinking for NMR/LC–MS/GC–MS studies.

Metabolomics Foundations & Experimental Design

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Session Index

Session 1

Fee: Rs 8800 Apply Now

Metabolomics Concepts, Matrices & Readouts

What is metabolomics? Scope, metabolome layers & study types

global vs targeted **steady-state vs flux** **metabolomics vs lipidomics**

Biological matrices & pre-analytical constraints (overview)

plasma / serum / urine **tissue / cells / media** **stability considerations**

Biological questions & hypothesis framing in metabolomics

disease vs control | time-course / intervention | pharmacometabolomics

Session 2

Fee: Rs 11800 Apply Now

Platforms, Workflows & Measurement Strategy

NMR vs LC–MS vs GC–MS — pros, cons & typical use cases

1H NMR | LC–MS (HILIC / RP) | GC–MS (derivatization)

Untargeted vs targeted designs & panel selection (overview)

discovery profiling | validation panels | isotope-labeled standards

High-level workflow mapping from sample to data matrix

sample intake | acquisition | peak table generation

Session 3

Fee: Rs 14800 Apply Now

Experimental Design, Bias & Power

Cohort design: inclusion criteria, matching & blocking

case–control | longitudinal | cross-over designs

Sources of bias & confounding in metabolomics

diet / fasting | medication / circadian | batch / run-order

Power, sample size & replication strategy (concepts)

biological vs technical replicates | effect size thinking | pilot studies

Session 4

Fee: Rs 18800 Apply Now

Mini Capstone: Study Protocol & Metadata

Translate a biological question into a full study blueprint

Theory + Practical

Randomization, blocking & batch layout for LC–MS/GC–MS runs

run-order planning **QC injections** **reference samples**

Deliverables: protocol, sample sheet & metadata dictionary

study protocol (PDF/Word) **sample & batch sheet (CSV)** **MIxS / MSI-style metadata**